**EXEMPLAR STATEMENTS**

**STEM, incl. Health-related subjects**

**Mathematics/Natural Sciences**

The beauty of mathematics is that it can be used elegantly to model anything in order to solve complex problems. This manifests itself clearly in many areas I am interested in, such as the explanation of the origin of the fundamental laws of the cosmos.

The deeply intertwined nature of mathematics and physics was emphasised in a lecture I attended at QMUL about black holes. We explored the Schwarzschild radius and time dilation concerning black holes. This used mathematics that led us to the eventual counter-intuitive conclusion that falling into a big back hole would be 'better' than a small black hole. Even complex, mysterious objects such as black holes, objects we can't even directly observe, can be modelled with mathematical equations. Having achieved the silver certificate in the senior UKMT challenge, I attended a Ri Mathematics Masterclass with a lecture on 4D geometry. Going from the foundations of geometry to using cubes and tetrahedrons to building shadows of tesseracts opened my eyes to how I could apply my current knowledge to concepts I had not previously come across in order to understand them. Over the summer I read 'Alice in Numberland' by John Baylis and Rod Haggarty. I was intrigued by how they defined the integers, then the rationals, then the reals, all from the starting point of the natural numbers. This gave me a deeper understanding of how even very complex mathematics is built on fundamental principles. I now question other mathematical assumptions and I have the desire to investigate how the basic building blocks of mathematics can be stretched.

Derivations of seemingly simple equations have always intrigued me. For example, deriving the simple equation for centripetal acceleration or finding the angle between two vectors using their dot products requires an advanced application of different concepts. Proving these simplifies a complex problem, allowing you to get the solution for any values you choose and provides a real sense of satisfaction and accomplishment. For example, using the previous examples, you can further derive the equations for centripetal force and the angle between two planes. I read 'Why does E=mc2' by Brian Cox and Jeff Forshaw which explored the derivation of Einstein's most famous equation. In an accessible way (unlike Einstein's original papers) it builds up an image of space-time (revealing that time is relative, not objective) and demonstrated space-time's importance in Einstein's theory. Similarly, chemistry allows you to model everything in the known universe in a mathematical way. After calculating rate equations and half-lives and using these to theorise about possible reaction mechanisms (for example the reaction between bromate and bromide) I see more ways that maths, and especially the problem-solving skills I have developed through it, can be applied. I have a true appreciation of the real world applications of maths as it allows you to calculate data that is important in industry, such as the activation energy of reactions.

Outside my academic studies, I have played the trombone for seven years and been a member o the Lewisham concert band for four years. Performing in front of crowds has taken me out of my comfort zone and boosted my confidence in activities such as public speaking. I have also taken part in various group activities such as NCS and a project where we had to design and execute a business plan to make money over a school lunch time. I was taught valuable skills about working as part of a team as well as how to plan projects ahead and execute them efficiently.

I would love to further explore my passion at university and see how far my knowledge can be pushed. I am sure my desire to stretch my understanding and my dedication to academic study will allow me to make the most of any opportunity I am given.

**Physics**

Discovery has always been integral to me as an aspiring scientist. As a result, I completed an extended project on the structure and effect of toxic substances such as strychnine, thallium and cyanide, and the accuracy of their use in Agatha Christie's novels. This allowed me to explore the science in my own time, beyond the constraints of the syllabus, helping me to improve my research skills. Circular motion has always interested me and many of my questions were answered by John Humberstone's lecture on gyroscopes at UCL. This and other lectures, ranging from Electromagnetic Induction to Thermonuclear Supernovae, encouraged me to set up a lecture society for students within my school, as a platform for students to share their passion with an audience of their peers. Mine will be entitled 'What is life', inspired by Erwin Schrodinger's book on the subject. I want others to be enthused to take an interest in science; later this year I will be running a science week, to make science accessible and enjoyable for younger students.

Studying science in a multidisciplinary way has allowed me to appreciate the importance of all the sciences in building a foundation for a complete understanding of more specific physical concepts. When researching the nervous system for my EPQ I was particularly interested in the polarity across neurone membranes - a concept that can also be applied to simple electronics. While studying light-dependent reactions in chemistry, I realised that we are more readily able to understand them when we consider the promotion of electrons into anti-bonding orbitals by the absorption of a photon's energy. Once I had some understanding of the interchangeable nature of waves and particles, and the energy transfer caused by a collision between a photon and an electron, the concept became infinitely clearer. In my opinion, the most profound scientific connection can be found in magnetism which cannot truly be explained without an understanding of d-orbitals in transition elements and special relativity. The language of mathematics underpins all of science, giving proof, explanation and clarity. An increasing awareness of the importance of mathematics prompted me to take further maths AS, despite having to teach myself aspects of the course. I already find myself engrossed in such concepts as the Euler identity and matrices and these have benefited my understanding of physics and also given me enjoyment, as the application of mathematics to physics is one of the most satisfying aspects of science.

I am yet to find an aspect of my life which is not dictated by the fundamental principles of physical science. The cakes for my weekly charity cake sale rely on simple chemical reactions to produce a gas, which expands in the oven according to Charles' Law, giving the rise. When playing saxophone on Radio 3 and at Ronnie Scotts Jazz Bar, or singing at the Deutsche Oper am Rhein, it is resonance which gives the saxophone and voice their sounds. The relationship between pressure, force and area allowed me to chop 30 kg of tomatoes whilst doing an internship at 'Le Manoir aux Quat' Saisons'. Even whilst building schools in impoverished areas of Tanzania, I found the influence of gravity in my own physical effort. Regardless of how far removed something seems to be from the academic study of science, nonetheless it can be explained by physics.

**Biology**

Whilst looking over the vast London cityscape from the top of the new Tate modern extension, it's hard not to question how our brains and bodies have evolved in order to become this developed as a species. It's incredible to think that we have come to a point where we are able to explore our own and other's evolution and existence.

Growing up visiting, and more recently volunteering at, the Greenwich Peninsula Ecology Park has had a profound effect on my desire to conserve and protect species. The park reflects the nature that historically thrived in the now non-existent marshlands and the fact that it acts as an urban haven for the organisms banished from their habitat due to urban sprawl is inspiring. Monoculture in the UK has continually been reducing biodiversity and, even though I experienced the sublimity of the South Downs and Kent Downs during my Silver Duke of Edinburgh Award expedition, the lack of biodiversity was a prominent feature of the landscapes. I have become more competent at maths and data collection, presentation and analysis- using Spearman's rank, student's t-test and chi- squared test to more effectively see correlations, comparison and statistical differences in my results. I am also keen to work on practicals on my own and in a pair or group and during lab work I am able to carry out accurate experiments whilst achieving valid and reliable results as I can be fastidiously precise. On a field trip to Boxhill I carried out extensive fieldwork on biodiversity and the biotic and abiotic factors that affect the ecosystem this enabled me to apply my identification skills and use sampling methodology. Dissection has become a practical skill which fascinates me, as it has helped me develop a visual in-depth understanding of whole organisms and their different adaptations to their surroundings. Studying biology at A-level has enhanced my knowledge of topics such as evolution, organ systems, transport in animals and plants, and I am looking forward to exploring these further at degree level.

Climate change is to me the most relevant topic of our time. The idea that human induced global warming is affecting so many species who are unable to adapt quickly enough to the unpredictable and extreme weather events and environments is to me unacceptable. The selfishness and lack of commitment taken by governments in the developed world is yet another situation that I find hard to stomach, however the Paris Summit is seemingly more hopeful in protecting not only nature but also less developed nations from feeling the effects of climate change. In 2012 and 2015 I joined the Greenpeace marches through London for the Save the Arctic campaign and Paris Summit campaign.Studying philosophy has helped me to see past the first layer of inference and made me consider, evaluate and break down the conclusions I draw in biology. However, I did find this subject frustrating, as much of what we were questioning had no substantial and factual way of being answered, in comparison to biology's empirically testable propositions. I love literature, and reading 'A Brave New World' recently, I felt my mind wandering to the familiar topics of biology. For example at the beginning when new students were being introduced to the labs where babies are mass produced, at the forefront of my mind was the process of meiosis the gametes undergo, and the ethical issues concerned with 'rearing' thousands of embryos.

Completing an Open Water PADI qualification presented me with a whole new ecosystem to discover and explore, and compelled me to investigate into the study of marine life. I have already booked a three month trip to Madagascar where I will carry out marine conservation and take the Advanced Open Water PADI qualification. This will also include teaching in a local school and wildlife conservation in the rainforest, and will offer me a chance to study a completely different ecosystem that my own school couldn't provide.

**Biochemistry**

Biochemistry is at the epicenter of current scientific research, which is one of the reasons I am attracted to it. Ever since science diverged into three disciplines in my academic studies, I have developed an affinity for biology and chemistry, and the instances in which they overlap; for example the chemical compounds such as amino and nucleic acids which truly are the building blocks of life. Chemistry is the backbone of biology and to some extent biology gives chemistry a purpose, whether it be DNA replication or drug discovery. Biology has given me an insight into the organisms of earth, the vital processes they go through and their environments; while chemistry has shown me how it is all possible, with chemical processes such as bonding, organic chemistry, reaction mechanisms.

Key to cutting edge biology are DNA and genetics. I marvel at how the combinations of the same four nucleotides produce such variety in the organisms on earth - the structures of the compounds are fairly simple, yet they create the most complex things known. Reading Matt Ridley's 'Genome' revealed the immense influence that the molecular world has on the processes of life, such as evolution. Recently, I attended a lecture at Leeds University on viruses that can cause cancer, an example of which is the human papilloma virus that can lead to cervical cancer. The virus causes alterations to the cell's DNA which interferes with the protein p53 and prevents apoptosis. Antiapoptotic proteins, like survivin, can also lead to the cell becoming resistant to apoptosis. The cell grows and multiplies uncontrollably, forming a tumor. These discoveries have given me a growing understanding that processes we see happening on a macro scale are actually the product of innumerable micro interactions. I read New Scientist magazine to broaden my scientific horizons and deepen my knowledge of pre-existing areas of interest or study. An article that recently caught my attention was about the recent breakthrough in cystic fibrosis gene therapy. Mutations in a single gene, CFTR, are what cause the life limiting disease, and now scientists have found a way to put copies of the gene into damaged lung cells by smuggling them into the lungs in liposomes. This was a concrete example for me of how our understanding of the gene and chemical processes can have real-world application in saving and improving the lives of ordinary people.

Maths has always been one of my favourite subjects. I love the methodical nature of it; it has lead me to automatically look for patterns in any information I study, aiding me in areas such as DNA coding and base pairing, and with data analysis tools such as spectroscopy. Studying geography helped me develop my non-fiction essay skills and how to conduct a comprehensive research project. I have been part of a child development research project at King's College University for the past eight years, which has given me insight into what it is like to be part of a longitudinal study. I found it intriguing; their passion for the project was inspiring and infectious, and lead me to believe that one day I could conduct my own research. I also took part in a scheme called the 'Brilliant Club'. This consisted of a post-graduate student tutoring a small group of us in an area of biology (evolution) for six one-hour Saturday sessions, and ended with us writing an essay on the subject. This was a different style of teaching than I had previously experienced, and I enjoyed the independence it encouraged.

Climate change, pandemics such as the recent Ebola outbreak and sustainability of resources are arguably the most crucial and immediate concerns of my generation. I feel that biochemists will play a major role in solving these issues. I relish being part of an industry that is genuinely about protecting and improving the planet and its inhabitants.

**Chemistry**

I believe chemistry is a fundamental to life on our planet, and through it we can discover remarkable new ways to understand the world we live in. Recently, I have been inspired by reading ‘Stuff Matters’ by Mark Miodownik which describes how the most ordinary materials all around us play a significant role in our lives. He answers questions such as why a book has a unique smell that increases as it ages - questions I had never thought about until I read this book. Suddenly, I was gripped by the history, production and future of paper products. I was fascinated to learn that during the ageing of books a range of VOCs are formed which are accountable for the special scent of books. I love books, and their unique smell has always been part of my enjoyment of them; this has helped me to understand how we connect emotionally and physically to the materials of our everyday lives.

I am intrigued by the impact of organic compounds on our lives, and how they those lives are shaped by them. Recently I came across a website called ‘Compound Chem’ which has helped me to explore my love of chemistry beyond syllabus, through topics such as the aroma compounds found in flowers. I have always really enjoyed experimental work - performing acid-base titrations is one of many practicals that have helped me to develop vital quantitative skills. My qualitative skills were demonstrated in experiments such as halogen displacement reactions where the ability to recognise precipitations are crucial to identifying unknown substances. I have learnt that to be able to identify limitations in experimental procedures and assessing the accuracy and precision of data is key. The scientific skills that I have developed in biology - such as handling experimental data and analysing trends to develop a conclusion - have been transferable to biochemical topics within the chemistry syllabus. Through learning about biological molecules, I see the vital importance of nucleic acids and amino acids which are the building blocks of life. In addition, maths has supported my understanding of mathematical calculations in chemistry and has strengthened my ability to approach a problem logically. Studying maths has significantly aided my ability to interpret information methodically, and specifically to understand rates and enthalpy.

The chemistry summer school at Imperial College was fascinating. I produced a project on CCS, inspired by my interest in the green chemistry module at AS Level. This involved carrying out a series of experiments to find out the rate of reaction between CO2 and different types of amines in order to come up with the most suitable amine for carbon capture. This project really opened my eyes to the application of chemistry in addressing key global issues, and in the future I would love to be part of a team to help solve these pressing problems. I was selected also for UCL and Imperial’s highly competitive medical programs, where weekly interactive sessions enabled me to explore recent scientific breakthroughs as well as increasing global threats, such as the rise in obesity. As a result of attending summer schools at universities including St George’s and Queen Mary’s I gained an Asdan Universities Award (Level 3) as well as being featured on Imperial’s website about my experiences. During my work experience at Charing Cross Hospital I gained valuable insight into the storage, uses and properties of drugs, which helped me to see the applications of chemistry in the real world.

Volunteering with Oxfam, I’ve enjoyed meeting people of all ages and backgrounds. I’ve also peer mentored students in science and reading - taking on responsibility motivates me to work hard. I am excited by the challenge of studying chemistry at university, in order to help to solve real world problems and to improve lives in the future.

**Mechanical engineering**

I used to wonder as a child how the bus I took to school worked. Now I know the whole complex machine is a carefully engineered thing, the product of careful design and analysis, and have only developed my interest in mechanical engineering.

I'm interested both in the history of the subject and in its future direction. For example, I'm fascinated by Diesel's persistence and ingenuity and have learned independently about compression ratios, combustion duration and the smoother temperature gradient of diesel engines that means more heat can be converted into mechanical work. I'm interested in how to make mechanical systems of all kinds more efficient. Careful design and analysis lets the engineer apply theoretical concepts and ideas to practical problems of this kind to make beautiful equipment that is a delight to use and also lets us progress to a low-carbon future. I would like to be involved in that. Good engineering also has a beauty to it that I find very appealing. I loved hearing recently that Ferrari air intakes are acoustically designed so that 3rd and 6th order harmonics are utilized, result: these are both efficient and have maximum consumer appeal.

As well as a drive to succeed, I believe I have the right academic skills required for a degree and a career in engineering. I am a strong mathematician, loving the logical, creative and methodical thinking required to solve problems: sometimes, the solution to a problem is not the obvious one, and I need to use all my skills to find an imaginative way to solve it. The satisfaction when I finally get there is immense. I love the challenge of more difficult topics such as more advanced calculus and proof by induction which I have encountered this year. I do love pure maths, but best of all is when what we study has an application to the real world, such as this term's decision algorithms that can be used to quickly optimise route choice for minimal duration and distance travelled, or the Eulerian analysis of graphs which tells you whether a graph can be navigated without passing the same point twice just by counting odd and even valences of each node. The idea that this kind of mathematical analysis can ultimately reduce driver time and fuel expenditure for a given volume of deliveries is brilliant.

Similarly, I love the direct applications to real life my physics course has given me. I was waiting in line for a rollercoaster at Thorpe Park and found myself calculating speed and gravitational potential energy changes throughout the ride and wondering how these related to the experience of the riders. I am working on thermal dynamics and mechanics right now and enjoying every moment. I have also learned from physics to be persistent when problems are hard and to think flexibly but logically with the formulae and ideas that I am familiar with until an answer falls into place. This kind of pattern-recognition and general problem-solving ability is something that chemistry has also taught me. In both subjects, my lab-work is particularly strong as I am confident under pressure and pretty meticulous. I sharpen two pencils each time.

This year I worked with a company called Opportunity Network which works with the general public matching people to adult education courses, as I would like other people to have the educational opportunities I have had. I also play midfield for my school team which was runner-up in the London School's Cup last year, so I can be organised, work well in teams, and am very competitive. Engineering allows you to make your mark on the world and I aspire to join this global profession in order to be involved in the creation of more sustainable technology for all our futures.

**Medicine**

I first became interested in the world of medicine when I moved to England from my home country Somalia in 2004, without any previous education. It was not until I had first been introduced to the education and healthcare system that I came to the realisation that people can live longer, healthier lives if provided with the right care. I have decided to pursue medicine, not only to give people a chance to lead a better life, but also to take full advantage of the opportunities that have been given to me.

My fascination with medicine has also led me to embark upon an extended project, within the topic of research into heart disease, focusing on the complexity of the heart and problems leading to myocardial infarction. Through this project, I feel that I have gained a small but significant insight into the scientific challenges that medicine has to offer, and have found the experiences both riveting and enticing. Within my A-level biology and chemistry syllabus, I really enjoyed studying enzymes and the chemical aspect of producing inorganic or using organic inhibitors to control metabolic reactions. As well as the effect of drugs on synapses, this is seen in the study of medicine quite frequently.

Attending a medical course at St George's University provided a good opportunity for me to consult with doctors and gain a professional insight into the vocation. I have also held a voluntary position at an elderly care centre for six months, where I was introduced to the caring side of the medical profession. Talking to patients about their experiences of care, I feel I have gained a degree of patience and empathy from my position at the centre, which I believe will aid me throughout the medical course and ultimately in the work place. I also managed to obtain another long term voluntary position at Queen Elizabeth hospital, where I gained an insight into the way that work load is distributed within a hospital setting, and the specific way in which different departments can work efficiently as a team to complete a task. Moreover, I have been entrusted for the past four years, with the responsibility of monitoring my grandmother's blood sugar level after every meal. To gain further insight into other aspect of the medical field, I spent two months at my local pharmacy, where I learned how various organisations within the healthcare system work together in order to holistically benefit the patients. Observing the pharmacists when distributing drugs and at times even formulate the drugs on site, permitted me to understand the procedure of the career. Though I have huge respect for these professionals, the kind of thrill that I gained when working with the respiratory team at Queen Elizabeth Hospital, while working with the terminally ill patients with diseases such as emphysema, was unmatched by my experiences at the pharmacy. This confirmed my desire to study medicine.

When I came to England that I got into the habit of playing football every Saturday morning in the park with people in the community. This routine taught me self discipline and allowed me to work on my time management skills, as well as showing me the value of commitment. I found this helpful when volunteering for my local charity shop. I was recently selected as the leading learner in my school, teaching additional maths to younger pupils, which has taught me about the importance of leadership and responsibility. I am currently participating in The Duke of Edinburgh Silver Award Scheme, which has given me the chance to obtain a first aid certificate, as well as the skills to carry out a cardiopulmonary resuscitation.

Studying medicine is an ambition and a passion that I have devoted a great amount of energy and motivation to realise, and privilege that I would love to obtain.

**Mathematics**

In a world so reliant on mathematical models and theorems, I have grown up believing that with mathematics at your disposal you could achieve almost anything. The new and exciting ideas introduced at A-Level have only increased my desire to study mathematics at university. I enjoy the challenge that each mathematical problem brings and admire the brilliance of how everything fits together in a theorem. Though what I appreciate the most about maths is that at the very end there is a guaranteed answer, and alongside a mathematical proof it becomes true forever, a powerful tool which is truly inspirational.The part of A-Level maths that I have a real interest in is working with statistical models and problems. Through that I realised how maths can relate to the real world, from calculating probabilities to predicting real life situations. I have also enjoyed the applicability of maths, how core methods like integration and differentiation evolved from finding the area and gradient of the graph to uses in more complicated equations involving first order differential equations and Euler's constant.

Over the years I have participated in a number of mathematical activities, spurred on by the chance to improve my abilities. One that was most memorable was attending a series of six Saturday Master-classes held by the Royal Institution of Great Britain. The topics varied from using mathematical proofs for defining Fermat and Mersenne numbers to the algorithms and matrices used in a search engine. I enjoyed these classes as they helped me gain a deeper insight to the practical uses of maths whilst helping me build my confidence on topics I touched upon at A-Level. I also went on a three day residential course at the Sutton Trust Maths Summer School. The lectures there tackled the concept of encryption and Fermat's Little Theorem, ideas of different types of infinities and interestingly the number theory involved in juggling. It was a stimulating experience, which made me broaden my approach to solving problems and appreciate how vital maths is in the world.

Within school I have always tried to explore maths outside the classroom, which resulted in me becoming a mentor and assisting students in the lower years. I also created and taught a lesson relating to centres of mass to give GCSE students a taster of A-Level maths during their year 10 "Directions Day". These experiences have helped me to solidify my understanding of concepts and shown me new ways to tackle a problem. My reading has helped me gain a better understanding of maths and given me a different perspective on problems. Singh's "Fermat's Last Theorem" has captivated me with every page turn, showing me a mathematician's determination and dedication as well as the skill and imagination it takes to solve a theorem that has eluded so many. I also read "Alex's Adventure in Numberland" by Alex Bellos which managed to expand my knowledge on probability and mental calculations while exposing me to the presence of maths in nature such as our logarithmic intuitions.

Taking part in the Duke of Edinburgh Scheme has driven me to be more confident in my decisions and become clearer in my communication to others which I can then apply to mentoring. I am a dependable babysitter and one who helps out every summer in the local library with children's activities such as reading and discussion groups. At times mathematics can be beautiful and elegant whilst at other times be exasperating and mind-boggling - but that is why I love it. No other subject can be as inspiring and universalas maths is and that is why I am determined to study mathematics at university, and being such a dedicated and hardworking student I know I will be able to reach that goal.

**Mathematics**

Beauty. This is what draws me to a world hidden to the vast majority of us - the world of mathematics. During my studies at A-level, it has become ever clearer that beneath the surface lies a complex, intricate and never-ending structural web with each new part reliant on another, but all perhaps reducible to the most fundamental axioms. I aspire to contribute to this web.

To me, maths is the only truly universal language - even in a different world with different laws of physics, this abstract structure would remain intact. Indeed, one of the things that draws me to the subject is the rigour of logical deduction and proof, which means that we can be absolutely sure that a proven result will always hold, even when it will forever be far beyond our computational ability to check every case. Only when I began to explore the whole new world of complex numbers did I glimpse how deep the subject is and how much more there is still waiting to be discovered. This drove me to learn some number theory, chaos theory and topology, despite their absence from the school curriculum. I am fascinated by the seemingly chaotic distribution of prime numbers, as expressed in Marcus du Sautoy's 'The Music of the  Primes', as well as the monumental quest through the centuries to find order within them, most notably via the Riemann Hypothesis with all its intriguing implications. Equally fascinating has been the mathematical journey to understand complex behaviours in deterministic dynamical systems, as expressed by Ian Stewart in 'Does God Play Dice'.

I have been studying the maths A-level syllabus independently to allow me to sit lessons in history in addition to physics, chemistry and further maths, as I value the ability to think critically about society, and write clearly. The latter skill and that of independent time-management, both key at university, have been helped greatly by the extended project that I completed in Year 12 on the creation of the NHS. I have wide-ranging interests, both academic and non-academic, but have come to realise that maths is without doubt the subject that excites me most. I especially enjoy finding links between different areas of maths and physics (with theory complementing experiment almost perfectly in the mechanics units), and even chemistry (for example the relationship between logarithms and rate equations). In my view, maths is a creative subject: I have always gained more satisfaction from solving open and extended problems by thinking outside the box, rather than merely deploying well-worn methods. I sat the Senior Maths Challenge paper last year, qualifying for the Senior Kangaroo, and with the increased understanding of mathematical thought that I have gained from Terence Tao's 'Solving Mathematical Problems', I hope to compete in the British Mathematical Olympiad later this year. I attended the UKMT's masterclass this June, and enjoyed learning about eccentric curves and Euclidean geometry.

I am an avid pianist; I play the clarinet too and have toured Canada and Italy with the school band. The science of harmonics has interested me from my primary school years. As a leading member of my school's debating club, I prepared an inter-school debate on the dangers of 'Smart Drugs'. I have mentored 12 year olds to improve their reading abilities, which I found immensely rewarding. I have also worked with secondary school children in a deprived Moroccan community during a World Challenge expedition, which came with the challenge of communicating across cultural and linguistic boundaries.

I am a dedicated student with the self-motivation to take full advantage of the wealth of knowledge and opportunity available at university, on my journey to becoming a mathematician.

**Nursing**

I want to study nursing as I have witnessed the changes this career has made to people's lives, including my own. I have direct experience of the importance of nursing care: my mum spent two years in hospital recently and only because of the expert and sensitive care that she received is she here now. I have always wanted to work in a hospital environment as it would give me a chance to put my interest in science to use in practical contexts and real-world situations. Being able to make a difference to people's lives, through contributing to their return to health, would be a privilege.

The work placement I undertook at Guys and St Thomas's hospital gave me an insight into the hospital as a workplace, and I saw first hand how many different members make up the hospital community, and the range of roles the healthcare workplace encompasses. It was amazing to see so many people working together with such skill. I enjoyed being part of such a skilled team, and hospital staff supervising me as an assistant to the stoma care team told me that I seemed unflappable. The experience gave me even more respect for people who work within clinical settings, and made me even more determined that I want to eventually become a member of that community, and contribute to its success. The time I spent with the nurses really showed me how I want to be able to make that much difference to people's lives. During my work experience I also spent some time with the dietician where I found out how important diet is to a healthy recovery. I also spent time with the pre operative assessment nurse this really took my interest; I never realised that a patient needs to be at a certain level of health even before an operation.

At A level I have enjoyed developing my knowledge, understanding and skills as a scientist. In biology, I particularly enjoy the human aspects, as I am intrigued by the science behind our anatomy. I enjoy practical work, where I can practise and develop my hands on skills. I am aware of the need for a meticulous and precise approach in the collection and measurement of data. Chemistry has also helped me understand the importance of chemical balance within the body and this biological chemistry was the favourite part of my course. I enjoy maths because I love problem-solving. Finding imaginative solutions to difficult problems is really satisfying. I particularly enjoyed decision maths, because it is about real-world applications. In English, I have enjoyed developing my critical skills, through the analysis of a range of different texts. I love reading, and my favourite book is Frankenstein, mostly because of its warning about scientific arrogance: I think that human beings should be at the centre of medicine. I am currently undertaking an Extended Project, where I am enjoying the process of pursuing my own research and developing my own independent line of argument.

I am also a part time carer for my mum - she has Antiphospholipid Syndrome, and has experienced some complications which I have nursed her through. The experience has helped me acquire many skills in aftercare, from dispensing medication to dressing wounds. This has taught me to be very rational and patient even in extremely difficult situations, such as when a stoma bag has burst at 2 a.m. and emotions are high. I have learnt to overcome such emotions, and think fast and practically on the spot. Another very important skill I have developed is patience when dealing with difficult situations under pressure. I am a very patient and determined person with good interpersonal and communication skills. Nursing seems to me to offer the ideal combination of intellectual challenge and care for the individual. I want to be able to change people's lives for the better by caring for them through the whole of their journey from illness to health.

**Pharmacy**

The study of pharmacy involves both biology and chemistry, subjects I love; it is an area of study at the forefront of scientific advance and development; it is vital to society, as we all rely on safe and effective drugs for our health. Pharmacy is an intellectually and morally compelling subject, and this is why I am applying for it.

Studying immunity and disease in biology, I was fascinated by the way our bodies are adapted to fight against infection. The immune system is a complex and highly developed one, yet its mission is simple: to seek and kill invaders. Being able to understand how the body functions has compounded my desire to study pharmacy. I want to be able to use my understanding of the complex systems underlying good health to help people understand the complexity and consequences of using drugs in everyday life. So many of us rely on drugs to make us feel better physically, but we also use compounds to affect our mental health positively. My recent module on neurology and the correct functioning of the brain’s neural network is also clearly relevant. I have developed good scientific skills from studying biology: my laboratory practice is meticulous; I can collect and log data and extrapolate conclusions from it, and have learned to write concise and accurate reports.

I love the creativity of scientific work and the interplay between theory and practice. For instance, in chemistry I have developed a good understanding of atom economy and percentage yield and used this in the design of a chemical manufacturing process giving high yield and very minimal waste. Yesterday I made iron tablets in class! We are moving on to aspirin next. I also understand the chemistry of a range of organic reactions and have further developed my lab skills, such as in my recent titration of methyl benzene. I can also use mathematical tools to explain reaction rates and help identify unknown compounds in analytical chemistry. Maths A –level has given me a good grounding in notation, algebraic manipulation, standard techniques around integration and differentiation, and made me able to visualise information using graphs and so on. Maths is difficult, and I have also learned therefore to be logical and persistent, and to be experimental in the range of techniques I apply to problems to try to solve them. My favourite module is the stats one, and so I have a good grasp of basic statistical tools and the various tests of significance you can apply to data-sets. This will help when thinking about evaluating the impact of different drug regimens.

I learnt a lot about the role of the pharmacist on my placement at Lewisham Hospital. Shadowing a range of health care professions enabled me to witness how they work together, as a multi-disciplinary team, to ensure the hospital ran as smoothly as possible. On the orthopaedic ward, I had the opportunity to talk to pensioners with arthritis, and learnt what it was like to be a patient, seeing the hospital from their perspective. I learnt that there’s a lot more to being a pharmacist than dispensing medication.This summer, I took part in a two-week research summer school run by KCL focused on diabetes treatment and the reduction of the amount of insulin peopled used. In the first week, we worked at Denmark Hill hospital looking at the impact of mental health on diabetes outcomes. I sat in on group interviews with patients and so understand their perspective on illness and their views of medical staff. I also studied and debated the ethics of drug testing, presenting my findings to the Ethics Panel. I have also enjoyed lectures at UCL about spectroscopy and organic synthesis. I am looking forward to the challenges which a degree in pharmacy will offer me, particularly as I will be the first in my family to have the opportunity to go to university, and also to a career where I can make a positive contribution to society.

**Pharmacy**

My interest in pharmacy was stimulated after I was diagnosed with rheumatoid arthritis at the age 16. Being started on a regime of disease modifying anti-rheumatic drugs propelled me to research the drugs that I was taking, particularly their mechanisms of action and side effects. Following this research I learned about concepts such as bioavailability, pharmacokinetics and pharmacodynamics and my passion to learn more about the drugs required to treat diseases such as rheumatoid arthritis ignited.

In order to gain experience of a work environment, I did voluntary work for one year at the orthopaedic ward at Queen Elizabeth hospital. My responsibilities included making beds, preparing food and talking to patients; as well as this I observed doctors, nurses, pharmacists and physiotherapists working together as a multi-disciplinary team to deliver care to the patients. This experience allowed me to understand the role of pharmacists in a hospital setting. I also have work experience in a local Lloyds Pharmacy and so I also have an idea of the work done by pharmacists in a different setting.

I believe that my study of chemistry, mathematics, and sociology provides me with the skills essential to undertake a degree in pharmacy. Chemistry, with its demand for accuracy in relation to analytical skills and knowledge of chemicals, provides the base for any approach to pharmacy. I also have enjoyed various aspects of my chemistry course, particularly organic chemistry topics such as organic synthesis where we made aspirin. Mathematics has helped me to develop my problem solving skills as well as to follow methods and processes logically in order to achieve the correct outcome. Sociology has taught me to be aware of, and sensitive to the needs of, different groups within society. It has also helped me to enhance my essay writing and communication skills. I can fluently speak Urdu, Hindi, and English, which is valuable for patient interaction.

For the past year, I have worked part time as a shop assistant at Greenwich and Bexley Cottage Hospice which is a charity shop in Blackheath. Through doing this job I have learned how to manage my time efficiently and enhanced my communication skills through interaction with the customers. Working as a teaching assistant for a reception class at Ealdham Primary School in 2009 was both fulfilling and interesting as I gained the skill of effectively communicating with very young children in an educational environment. Earlier this year, I arranged a van pulling competition in order to raise money for the charity Jeans for Genes which supports research into genetic disorders. I was the only girl in a 12 strong team, and successfully pulled a Ford Transit van some distance to raise money; I also organised a Christmas cake sale which raised a good sum of money for Greenwich and Bexley Cottage Hospice. As well as the financial aid, I helped to raise awareness of the work done by hospices to teachers and fellow students.

I have battled against the odds all of my life. I was estranged from my mother as a toddler and my world was turned upside down at age five when my father was given a lengthy prison sentence. This lead to me being put into care and I have not seen any of my birth parents since. Fortunately my foster family was loving and supportive and encouraged me to aim high as possible. I feel that I have made the most of the opportunity at my disposal despite facing many obstructions in my life. I am fully committed to a career in pharmacy and I possess the clarity of focus, strength of character and perseverance needed to succeed.

**Zoology**

I am passionately interested in zoology in both a practical and theoretical sense. The idea the animals have survived and flourished around mankind, independent of technology and in spite of industrialisation fascinates me, and from an early age I have regularly visited my relative's veterinary practice where I was able to indulge my keen interest in animals by observing the vets at work. Having had many pets as a child, the fascination that began from a young age has developed over the years into a drive to further my understanding from a scientific perspective.

In order to aid this understanding, I chose biology at A level, where I have enjoyed developing my analytical as well as my practical skills. Over the course I have taken a particular interest in the variety of living organisms, specifically species diversity and courtship. I would also love to study these in further depth. I am naturally inquisitive and I am particularly looking forward to studying natural selection and speciation in the A2 course. I maintain my fascination with biology outside school and I often visit zoos and take part in projects to further my understanding. For example, I am currently involved in a project called 'I, scientist' (a collaboration with an innovative thinker and scientist, Beau Lotto who runs an experimental laboratory at the Science Museum), which is about sensory perception and developing the scientific thinking of young people. I have been inspired by Beau's enthusiasm and creativity and the way he incorporates a multi-disciplinary approach to his studies.

I am fascinated by animal psychology and physiology and my A level in Religious Studies has helped me form my own conclusions about ethical matters. Mark Hauser's 'Moral Minds', has caused me to reflect on naturalistic ethics. He considers the link between morality and our biological make up, something I find very interesting, although I do have my criticisms. Also in taking RS, I have developed my argumentative and debating skills. I also chose to study Maths at A level. I am interested in the way population genetics uses probability as a method of calculation, as well as modelling to predict population growth. Not only is Maths useful for calculation, it also provides analytical skills when working with data. Maths requires you to have a logical mindset, as well as persistence when faced with a challenge, and I feel I have developed these skills.

For over eight years I have been attending Forest School Camps - an educational children's camp aimed at teaching independence from urbanisation and technology. Being so far from one's natural environment poses all sorts of challenges but has also helped me develop my sense of personal responsibility (most recently I worked as a member of staff, and was responsible for the safety and well being for a group of children), independence and practical problem solving skills. I am good at making new friends and developing long lasting collaborations. I have also enjoyed learning about other people's cultures and mythical frameworks. I regularly visit the theatre and cinema. I enjoy painting portraits in my free time and I have been commissioned to make images for friends and family. I enjoy listening to experimental music and I have attended a number of live music events this year.

I am an enthusiastic, confident and responsible person. I believe that studying zoology will benefit my education and assist me in discovering a future career working with and for animals.

**Chemical Engineering**

I first started thinking about chemical engineering as a degree choice when I became aware of the vital roles chemical engineers play in our society. The modern world is full of materials and products that have been created through the application of chemical, physical and biological principles. From better fuels and cosmetics to modern high-performance sportswear, chemical engineers have shaped many aspects of our lives today. They are involved in vital issues surrounding climate change and methods for moderating its effects. I like the creativity and problem solving ability of the industry and the way in which issues of environmental impact and sustainability are taken into consideration when designing manufacturing processes. It is a field that offers a diverse range of career paths which excites me.

My A Level subjects are based on a curiosity about the natural world and a desire to understand how it works. This has always appealed to me, along with the application of fundamental principles to problem-solving in real-world settings. I recently achieved gold in the UK senior maths challenge competition; this demonstrates my aptitude in mathematics which is vital for a chemical engineering degree. In my A2 chemistry course I came across chirality in pharmaceutical synthesis and it fascinates me how certain molecules have very similar structures, yet very different effects due to the presence of a chiral carbon. After being introduced to thermal physics and entropy in my A level course, I am most looking forward to studying thermodynamics at university. I attended a summer school at the London Metropolitan Archive on light and optics. A particular focus was on early photography and the problems that were encountered such as image deterioration. On researching further, I discovered that the photo-oxidation of polymers that causes deterioration is a radical substitution reaction. This linked with what I had learnt about the role of free radicals in ozone depletion in my AS chemistry course.

At a STEM pathway summer school at Imperial College London, I studied physics and engineering; this gave me an insight into university life and style of teaching. Whilst there, I learnt about robotics and prosthetics and noticed how a good understanding of physics had to be applied to biological systems to ensure that the prosthetics worked as intended. I was able to make my own prosthetic limb from materials provided and tried it out. On the last day I gave a presentation on the things I had learnt throughout the week, giving me important experience in developing good communication skills and the effective use of visual aids. I also attended an engineering master class at Cambridge University which gave me an insight into the SPICE (Stratospheric Particle Injection for Climate Engineering) project. This is examining the possibility of cooling the planet by means of Solar Radiation Management (SRM) and investigating the benefits, risks, costs and feasibility of SRM through the deployment of reflective aerosols in the stratosphere. I found this fascinating because it is so ambitious and showed how chemical engineers were planning to tackle a global problem using chemical engineering principles.

I work part time in a restaurant and I am also responsible for training new employees. This has given me a good experience of managing people, teamwork and working with the public. I play for a local football team and I am also an athlete. Athletics in particular has really taught me discipline as it demands intense training sessions and a strict diet. I believe I possess the skills and interests to succeed at university, and have demonstrated that I am enthusiastic, disciplined and serious about pursuing a career in chemical engineering. I also look forward to contributing positively to the wider student life at your institution.

**Computer Science**

I find it intriguing that despite computers being such an integral part of our daily lives,

relatively few people actually understand how to program them and what exactly goes on behind the interface. I look forward to learning more about how computer systems operate and creating content that can help me understand the world and change it for the better.

I have always enjoyed studying and applying mathematics. Being a dyslexic student, at a younger age, I sometimes felt frustrated that my abilities in English were not equal to those of other students. However, I have always excelled in maths, this gave me the confidence to persevere through school and develop skills that I was lacking. Through studying A-Level mathematics and further mathematics, I've really enjoyed using my mathematical knowledge to solve problems and develop proofs - this has been a challenging part of the courses and has enabled me to develop my logical thinking skills. What I really enjoy as well is applying my mathematical knowledge to real world problems. Decision maths has given me some experience implementing algorithms such as Kruskal's and Prim's. My study of further mathematics has really strengthened my reasoning and problem solving skills while giving me a great foundation to build my Computer Science knowledge upon.

Through studying A-Level physics, I have developed further skills that I will be able to apply when studying Computer Science. Physics has taught me the importance of synthesising different ideas to create a complete overview of a subject area: for example, in mechanics, working out the coefficient of friction between a box and a slope using F=ma considering all the forces acting upon the box. As well as this, I've developed my analytical and evaluative skills whilst carrying out scientific experiments. I have some experience of programming using HTML to create simple webpages. Although it was relatively basic, I really enjoyed the challenge of learning something new that I taught myself. I found it satisfying watching my code come to life and I am looking forward to learning other programming languages and seeing what I can create after developing my coding skills. Another aspect of Computer Science that really attracts me, is that it combines theoretical knowledge and practical skills.

I believe I have a range of skills to bring to the study of Computer Science; I am a very

logical thinker, whilst also having the ability to develop innovative and efficient solutions to new and unfamiliar problems. This was demonstrated when I took part in 'The Brilliant Club', a programme which partners academics to mentor gifted students to reach their potential. I was mentored by a PhD student from the University of Sussex. The process involved six weeks of university style tutorials and coursework which I thoroughly enjoyed. It also gave me valuable experience about the university learning environment. Another experience which demonstrates my logical thinking was my participation at the O2 Arena in setting a new world record for the most Rubik's Cubes solved simultaneously. I found using algorithms to complete the cube fascinating, and by the time of the event I was able to solve the cube in under two minutes. In addition, I was a member of a test group of students for the tech company SMART Technologies in the development of their collaborative learning application SMART amp. This gave me a real insight into how pioneering applications are made and this is something I can see myself doing in time to come.

The future really excites me; studying Computer Science at university will broaden my knowledge and practical skills in many fascinating areas. Being surrounded by likeminded, enthusiastic people will benefit my learning and I can't wait for the challenge.

**Engineering**

I grew up in house that was fairly technically orientated, and some of my earliest memories are of my dad scribbling simplified diagrams of machines onto the back of old envelopes. As a child I would get up on my tiptoes every time my dad was fiddling with the engine of our car just to catch a glimpse at the metallic maze of cables and pipes that intertwined with each other, imagining in my head the functions of each piece.

I chose to study physics as I was interested about the world around me and how it can

simultaneously be simple and predictable but also intricate and random. Physics is applied and integrated into so many parts of modern life, whether it is the complex circuitry that is found in our computers,the fibre optic cables under our oceans and satellites orbiting our planet that act as the backbone of the our information age. I enjoyed learning about electricity and basic quantum physics. It was interesting to see the correlations between voltage, resistance and current and also how and why they exist while also looking at how they vary through different materials like conductors and semiconductors. Engineers have to consider things like this when undertaking a design challenge. I also enjoyed learning about wave particle duality and found it interesting that something like an electron could exhibit properties of both depending the experiment you put it through.

I Like chemistry as I get to explore the processes we use in everyday life and how we have used them to our advantage but also our disadvantage. From crude oil and other natural hydrocarbons we have artificially created complex polymers that are as strong as steel but light and flexible. We are also however disrupting the natural equilibrium of planet by the continued combustion of fossil fuels, the fumes of which perpetuate the greenhouse effect and cause the warming of our planet at rate that exceeds any other time of human existence. Chemistry may have to find an answer to this whether it is alternate fuel sources such as biofuel or things like biodegradable plastics to mitigate the damage to our environment caused by landfills.

I always like to expand my knowledge and enjoy reading up on subjects we haven't touched yet or ones we might not touch in school. I have read books on space travel (The Case For Mars) and have also attended a lecture on Einstein's theory of relativity at University College London. I especially enjoyed the book "The Case For Mars" by Richard Wagner and Robert Zubrin, which explores the idea of a manned mission to mars within a decade at a heavily reduced cost than the mission proposed by NASA in the 90 day report, utilizing off the shelf technology. What Interested me most though was it application of an in situ propellant plant, I thought that this was quite an abstract way of approaching the cat and mouse chase between the weight of the launch system with fuel and the amount of thrust required to get to mars.

Both inside and outside of school, I enjoy music. Since I was 13 I have been playing guitar, mostly self taught, but I have had some great help with it. I started to play when my dad brought home a guitar and taught me to play a handful of chords and from there I was off. I like it as it gives me a creative release and it has definitely shown me the benefits of practice, repetition and hard work. I have performed both on my own and as part of band in front of crowds. I also sailed for 2 years and it taught me valuable lessons on problem solving and perseverance and recently have started going to Marine Cadets which has helped me to handle challenging situations by teaching me self discipline as well as giving me the abilities to integrate into a team in a short amount of time.

**Veterinary Medicine**

As a curious and able student with a keen interest in science and a deep-seated concern for animal welfare, I am eager to embark upon a career in veterinary medicine. Growing up with animals and taking responsibility for their care, as well as excelling academically, particularly in the sciences, I am excited about the prospect of beginning a challenging course which will lead me towards a varied and rewarding career as a veterinarian.

As a student of biology, I have focused on expanding my knowledge and understanding of the anatomy of, and biological processes that occur in, animals. Of particular interest has been the recent work I have completed on the immune systems of animals and their primary defences against disease and illness. Specifically, I have enjoyed learning about the effects of different drugs upon the processes and chemical reactions in an animal's body, such as anti-inflammatories which block the effect of COX enzymes and how penicillin weakens the cell walls of bacteria causing them to burst and die. In chemistry, I have enjoyed developing a wide range of analytical techniques that can be used to identify different molecules and compounds, which has provided me with a solid grounding in some of the analytical work, such as blood or urine tests, undertaken by practicing vets. Through maths, I have strengthened my problem solving skills and increased my ability to take a logical as well as an imaginative approach to problem-solving. AS Level psychology gave me a fascinating insight into animal attachment studies, explaining, through the work of Lorenz and Harlow, the behaviour of young animals towards their primary caregiver.

I have striven to compliment my academic progress with professional experience working with animals in related fields. During a placement at Companion Care vets, observing consultations and operations, I gained valuable insight into the everyday challenges that vets face, such as consoling owners and managing an intense workload. During my period of work experience, I was also trusted with a wide range of administrative responsibilities that helped support the smooth running of the practice, showing me just how vital teamwork and collaborative effort are in the operation of a successful practice. Since August 2015 I have been volunteering at Celia Hammond Animal Trust, where I am responsible for feeding, cleaning and socialising with the cats and kittens, as well as being trusted to administer some of the medications, which gives me the chance to ask questions and discuss the cats' conditions with the vets and nurses - such as the recent case of a kitten with brain damage, and its associated animal welfare issues. This experience has been a unique opportunity to work as part of a team and to give back to the community.

I am a keen horse rider and enjoy helping out at my local RDA stables, developing my communication skills through interacting with individuals with a variety of disabilities. Observing the care of the horses, mucking out stables, and feeding and grooming has provided me with an insight into animal husbandry. Helping with vulnerable young riders, I have learnt that safety is a major priority. The DofE award was an amazing experience, allowing me to further develop my team working and problem solving abilities. The UNIQ biology summer school at Oxford included the exciting opportunity to work in an undergraduate laboratory.

These experiences have reinforced my desire to become a vet, employing my scientific understanding, compassionate nature and interpersonal skills to ensure the welfare of animals and their owners.

**Dentistry**

As a young child in Syria, I used to visit my aunt's dental clinic, where I was fascinated by the intricate work that she did and the delicate equipment used to execute complex tasks; I found myself asking more and more questions about the processes, and it soon became clear that dentistry was my future.

My curiosity grew as I was able to undertake work experience at a Kidbrooke NHS Practice. The work there included routine checkups and filling procedures and after closely observing the behaviour of the dentist, I discovered how focused and attentive to small details he was. I learnt about the importance of collaboration between the dentist and other team members, as well as the importance of excellent interaction with patients which is key to building relationships that can deliver the optimal treatment and ensure patient satisfaction. My experience at an implant specialist surgery where I witnessed procedures such as the attachment of a crown to an implant in a decayed tooth also helped me to see that patience and the ability to work carefully under pressure for long periods of time were key for successful operations. The work was extremely challenging and showed me the variety of procedures that dentists perform, as well as the vast knowledge that they possess.

My interest persisted through my A-level choices; I relish studying chemistry, particularly aspects of organic chemistry such as optical isomerism, which contributes in drug synthesis. This is key to dentistry, as being a dentist requires frequent prescription of a variety of drugs and therefore knowledge of their properties and suitability. Chemistry also teaches me the importance of rigorous and meticulous laboratory methods as well as how to spot patterns in data and analyse them, as does biology, where I have enjoyed learning about the nerves' main arteries, such as inferior alveolar, and how they conduct impulse to supply sensation to the lower teeth through sensory branches. Maths has helped me to develop strong problem-solving skills, and the ability to examine and analyse complex data. I'm particularly interested in how modern technology gives rise to new dental procedures, such as tooth implants and laser whitening.

I think I have an unusually international outlook for someone of my age. At school in Syria, I captained our maths team that won the gold medal in the 'NSA' Olympiad in Aleppo; I was also in the Scouts there, and have a good understanding of the importance of civil society during the time when there was an unstable civil environment. As a caring individual, who is keen to give back to the community, I found volunteering to help blind people use braille keyboards and contributing in the 'Ihsan' charity in their work for the deaf incredibly rewarding. I also lived in Rome for three years between 2004 and 2007, where I played nationally competitive basketball. Competing at this level meant I learned about resilience, commitment and the need to be able to keep calm under pressure - this set of skills which made me a great team member are clearly vital in the dental field. I speak relatively good French and completely fluent Arabic because I've moved around a lot, this helped me develop social skills as I learnt to get along with people from different cultures and interact with them effectively. One of the things I'm looking forward to as a professional dentist is the diverse backgrounds of people involved, and communicating with them in a respectful manner is crucial.

What's happened to my family because of the Syrian conflict has also made me aware of the value of education: I'm excited about the challenges that university will offer.

**Mechanical Engineering**

I have always been fascinated by the fundamental forces and principles that determine the behaviour of machines. One of the greatest mechanical projects that has left me in awe is the construction of the Large Hadron Collider by CERN. I found myself wondering: how is it mechanically possible to accelerate a beam of protons to a velocity close to the speed of light; and what were the engineering challenges faced when executing the carefully designed plan? Researching the LHC, I found that the major issue faced was with a magnet quench where the superconducting magnets that guide the beam of protons in order to result in successful collisions were damaged by a faulty electrical connection. It's this curiosity and fascination that has led me to apply for mechanical engineering at university.

Studying mathematics and physics at A level provides a solid base for understanding the required mathematical and physical knowledge in order to pursue a career in mechanical engineering. I am excited by the discipline, because it unifies my favourite subjects and allows me to link a whole range of different ideas that we have explored throughout the course. For instance, learning second order linear homogeneous differential equations in further maths allowed me to derive a general solution for simple harmonic motion, which is what I am currently studying in my physics lessons.

Exploring beyond the syllabus I have read 'Incredible Numbers' by Professor Ian Stewart. Reading it made me feel as though I had dipped my toes into a vast ocean, where I uncovered sides of mathematics I had never seen before; from discovering a range of neat tricks regarding puzzles like the tower of Hanoi, to the golden number. One of the topics I found quite spellbinding was string theory. The mere thought of 11 dimensions existing left me thinking how this was possible. Although sometimes, such theories can be mathematically pleasing, it may not always be the case that physicists will like it too. However, this is where engineering plays its vital role, in particular the building of LHC, which is operating every day in order to find answers such as whether or not the very reality of string theory can be proved. Reading chapters of Richard Feynman's lectures, volume 1, deepened my knowledge of physics, allowing me to continue my learning outside the classroom. Topics such as thermodynamics were fascinating, and I am looking forward to developing my understanding of these topics, and their applications, at university.

Outside of study, I have participated in a number of activities. This included the UKMT Senior Team Challenge which enhanced my ability to work collaboratively as part of a team in order to solve complex problems. Keeping up the team spirit and being able to work efficiently under pressure is, I believe, an essential skill to hold in the engineering world. I maintain my own sewing machine having studied textiles and in my spare I enjoy sewing and fixing garments. This is a useful skill in terms of mechanical engineering, because reading a pattern when making a garment requires you to think visually, and it also involves taking into account all the things that can go wrong, and bearing in mind the precautions you might need to take fix them. I have also worked in Boots in customer service, managing time and the working environment. Volunteering at an elderly people's home as part of the NCS challenge, I designed a campaign to raise awareness for mental health. As a member of the student voice, we tackle issues in the school and find ways to resolve them.

I look forward to having the opportunity to build on the ideas and concepts I have learned, taking them to new levels, meeting like-minded people and sharing ideas and insights into problems that excite and challenge me.

**Experimental Psychology**

Reading the neurologist Oliver Sacks' 'The Man Who Mistook His Wife for a Hat' opened my eyes to the amazing capacities of the human mind and, more significantly, its abnormalities. I am intrigued by how such a vital complex organ can determine so much of our lives and therefore I am excited about the prospect of a degree that takes a rigorous experimental approach to the understanding of these complexities.

I am particularly interested in psychopathology, and have explored some of the explanations behind anxiety disorders such as the 'worry circuit' in OCD, which will only occur if the caudate nucleus is damaged, thus provoking OCD symptoms. Linked to this area of study, I am currently exploring the ongoing and fascinating debates surrounding schizophrenia. Reading Lance Workman's article in the journal 'Psychological Review', which adopts a strong biological approach, I found the hereditary explanations particularly persuasive – according to the article, 100% of those who develop it, have family history of the condition. However, I also found social interactionist contributions to this debate valuable, such as the social brain hypothesis, which claims that it is the brain's ability to over-interpret social situations that creates a susceptibility to schizophrenia. What really fascinates me is looking at these theories not as the false dichotomy that is often presented, but at how they can inform one another.

I have also been fascinated to see the ways in which my A level disciplines intersect: I am now revisiting the ideas of Piaget on the cognitive development of children's language in English, a theorist whose ideas I first encountered through attachment in psychology last year, and volunteering at a Saturday French school for bilingual children gave me the opportunity to work with a group of toddlers whilst they undergo the 'critical period' during their language acquisition. Chomsky's nativist theory is also compelling, as the virtuous errors children make when learning language cannot be explained by behaviourist theory: our brains must be hard-wired to acquire language, through what Chomsky terms the LAD. However, the notion that all our behaviours are hard-wired is contentious: studying the influence of gender on language, I have found the ideas set out by Cordelia Fine in 'Delusions of Gender' fascinating, particularly as her credentials as a neuroscientist make her demolishing of the argument that gender is hard wired into our brains particularly compelling. Chromosomes ultimately determine an individual's biological sex, but gender is a complex and intricate thing; Freud's psychodynamic theory suggests that gender is defined by overcoming either the Oedipus complex or the Electra complex during the phallic stage when their libido is focused on the child's genitals, suggesting both biological and social factors are significant.

As a school mentor, I support a group of dyslexic teenagers to build their confidence and deal with anxiety issues; I've also volunteered at the Eltham Toy Library, working with children with anxiety disorders and learning difficulties, and during my voluntary work at the French school, I have also worked with individuals with mental health conditions. With the mental health of young people in crisis, I think it is crucial not only to talk openly about these issues, but also to listen to children, and ensure all their voices are heard.

Last summer I enjoyed the challenge of the National Citizens Service. Being a member of the Greenwich Swimming Club gave me the opportunity to swim competitively, and the psychology of competitive sport is something I am interested in exploring further. I am excited about the challenges and opportunities university will offer me.

**Paramedic Science**

Life, death and uncertainty: these are the concepts that experienced paramedics will know far too well. I became inspired by the stories I read online about paramedics who saved multiple lives or witnessed the death of individuals and how they were able to mentally overcome the challenges of these traumatic experiences. For example, Sonia Powell - aged 73 - died whilst still in the ambulance; as a result, paramedics would have had to overcome her sudden death and still remain professional. This is something I myself am willing and able to take on.

Paramedics need the ability to adapt to changing environments. From participating in sports, such as football, I have experienced changing strategies and making appropriate changes to my performance depending on what is taking place in the moment. I have a strong sense of community and take pride in being involved in my local community whether it be by signing up to be a peer supporter, joining my school council or trying out local clubs such as football, tennis or running. By participating in sports such as boxing and football, I have honed my team working skills; on the other hand, boxing also encourages independence which can be a key element for paramedics who are working alone. Furthermore, at the age of 14 I started boxing because, like being a paramedic, this sport demands individuals to have high levels of discipline, stamina and independence. It requires everyone to push their body and strengthen the mind: essential abilities needed for this line of work. I enjoy giving back to my local community and this is the reason why I volunteer at the toy library in Abbey Wood for disabled children. In my eyes, becoming a paramedic is one of the best ways I can personally give back to not just my community but many others as well.

Studying health and social care has given me a greater and deeper understanding of health and social care services. For example, the care values and laws - such as the Care Minimum Standards Act or the Medicine Act, which govern and ensure that the services provided meet the expected standards. By having knowledge of relevant laws I will be able to provide a high quality of service. One of the most valuable skills that I will be able to incorporate in both areas (work placement and study) is my knowledge of the main functions of the 10 body systems. This knowledge will be a good foundation on which to base my further learning on the biological structure of the body.

In sociology, I have learnt that different ethnic groups have different ways of undergoing the same processes: for example, they may have different views on health care or treatment. This knowledge will enable me to understand and respect the culture of all ethnic groups, valuable for paramedics as they aid people from different cultures. Understanding diversity is crucial l for this sector of work as it promotes providing a service that treats people with respect and dignity. I take my academic studies very seriously and am able to take constructive criticism from my peers to improve the standard of my work; I believe it's important to be able to learn from others around you and work as a team. Work experience in a local nursery helped me to understand and practice my verbal and nonverbal communication skills. I have also completed two weeks' work experience in a hospital in the radiology department and trauma clinic, developing my ability to establish interpersonal relationships in a stressful professional environment. These skills will prove vital as a paramedic due to the variety among service users. Relevant experience in communicating with people of different age groups and in different settings can aid in reassuring patients in difficult or sensitive situations. All this means I am a good candidate for this course.